M4.06.0 Silica Fume Modified Cement Concrete Masonry.

Silica fume modified cement concrete masonry shall meet the requirements of M4.02.00 in the classifications listed below and modified by the addition of a silica fume admixture.

28 Day Compressive Strength (MPa)	Maximum Coarse Aggregate Size (mm)	Minimum Cement Content (kg/m^3)
35	20	405
35	10	425

The concrete placed shall be a high slump (150 ± 25 mm), air entrained (7 ± 1%), cement concrete masonry. The silica fume shall be added at the rate of 6 ± 1% (dry weight) of the cement content. The total cementitious content is specified as the minimum cement content. The water-cement ratio shall be .40 maximum. The water content of the silica fume additive shall be included in the water-cement ratio.

If dry densified silica fume is used it shall be mixed for a total of 120 revolutions to ensure proper dispersion of the powder. The mix shall contain superplasticizer conforming to AASHTO M 194 Type F or G, which shall be added in accordance with the concrete technicians recommendations. The amount of superplasticizer added to the cement concrete at the batching facility and at the job site shall be recorded on the delivery slip. The delivery slip shall be signed by the concrete technician. The concrete technician shall be supplied by the microsilica manufacturer and be either an ACI Certified Concrete Technician (minimum Grade I - Field) or a New England Transportation Technician Certification Program - Certified Concrete Technician.

All trial batches will be performed at a 175 mm maximum slump. Coulomb tests shall be made on two 100 X 200 mm representative samples which have been moist cured for a maximum of 90 days. Coulomb tests on trial batches shall be performed as early as possible during the construction season in order that the approval process does not delay the anticipated date of Silica Fume Modified Cement Concrete Masonry placement. Tests shall be performed by an independent AASHTO accredited laboratory. If test results exceed a maximum of 1500 coulombs, the Contractor, at his expense, shall adjust the mix and resubmit trial batches until a batch passes the coulomb test.

Silica fume shall conform to AASHTO M 307. Pre-blended silica fume cement meeting both AASHTO M 307 and AASHTO M 240 Blended Hydraulic Cement may be used for producing Silica Fume Modified Concrete provided that the overall amount of silica fume is 6% ± 1% (dry weight) of the weight of portland cement. If pre-blended silica fume cement is proposed for use, the Contractor shall provide certificates from the manufacturer which certify that the silica fume meets the requirements of AASHTO M 307. The Contractor shall obtain a written statement from the manufacturer of the microsilica that it is compatible with the other materials from the sources proposed by the Contractor along with mill analysis test certification demonstrating conformance to the referenced specifications.

Prior to concrete construction, the Contractor shall develop and forward a copy of the Silica Fume Modified Concrete design mix to the Department for review and approval. Approval of the design mix must be obtained prior to placement of concrete. The mix design sent to the Department must be accompanied with trial batch information. Trial batches shall be performed in accordance with procedures outlined by the Department. The Contractor shall have technical representatives from the silica fume supplier and the ready mix producer at the job site during placement of the concrete. The concrete technicians shall each meet the certification requirements as referenced previously in this section. The Contractor will assume these costs.

Appropriate retarders and high range water reducers shall be used as recommended by the ACI certified concrete representative to ensure that potential for the formation of temperature induced plastic shrinkage cracking is minimized.